

# PLASTIC OMNIUM

## A REFERENCE PLAYER IN HYDROGEN MOBILITY

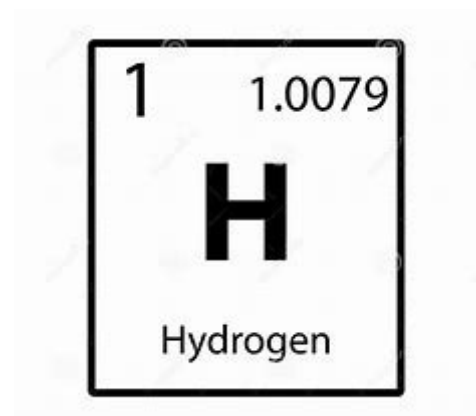
SEPTEMBER 28<sup>TH</sup>, 2020

# What is Hydrogen?

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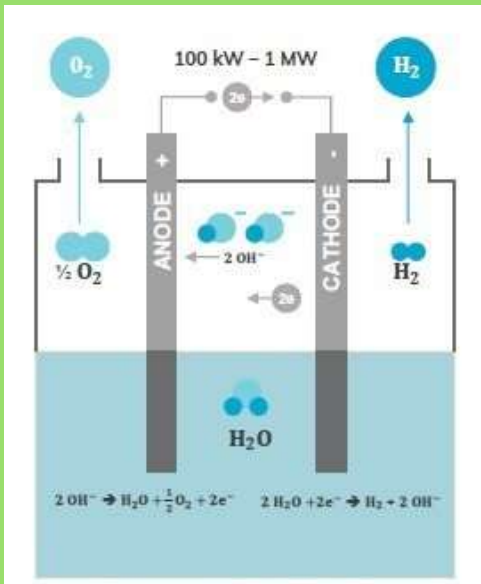
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- MOST COMMON ATOM IN THE UNIVERSE
- 1<sup>ST</sup> ELEMENT CREATED AFTER THE BIG BANG
- RICHEST ENERGY SOURCE FOR STARS
- EXTREMELY ENERGETIC (120kJ/g)



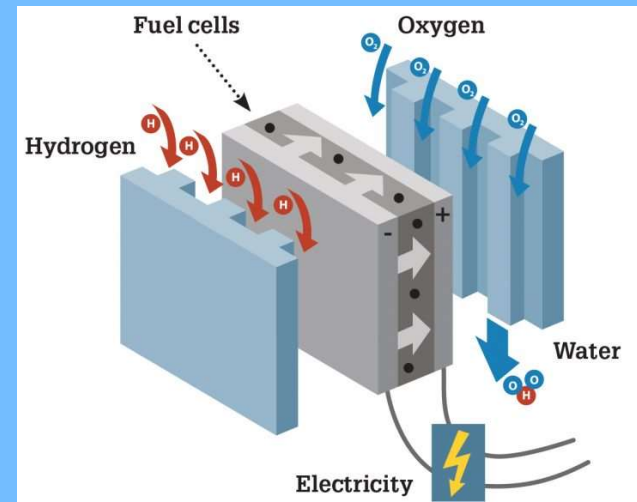
# What is Hydrogen?

IT CAN BE GENERATED  
IN A GREEN WAY



Process of Electrolysis

THEN USED TO PRODUCE  
ELECTRICITY



# Why now? Drivers and indicators of hydrogen's momentum

## Drivers of renewed interest in hydrogen



Stronger push to limit carbon emissions



Falling costs of renewables and hydrogen technologies

## Indicators of hydrogen's growing momentum

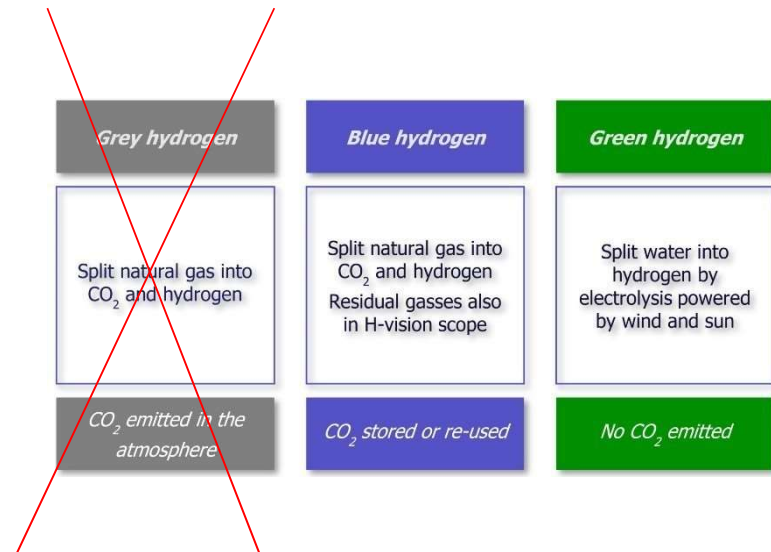
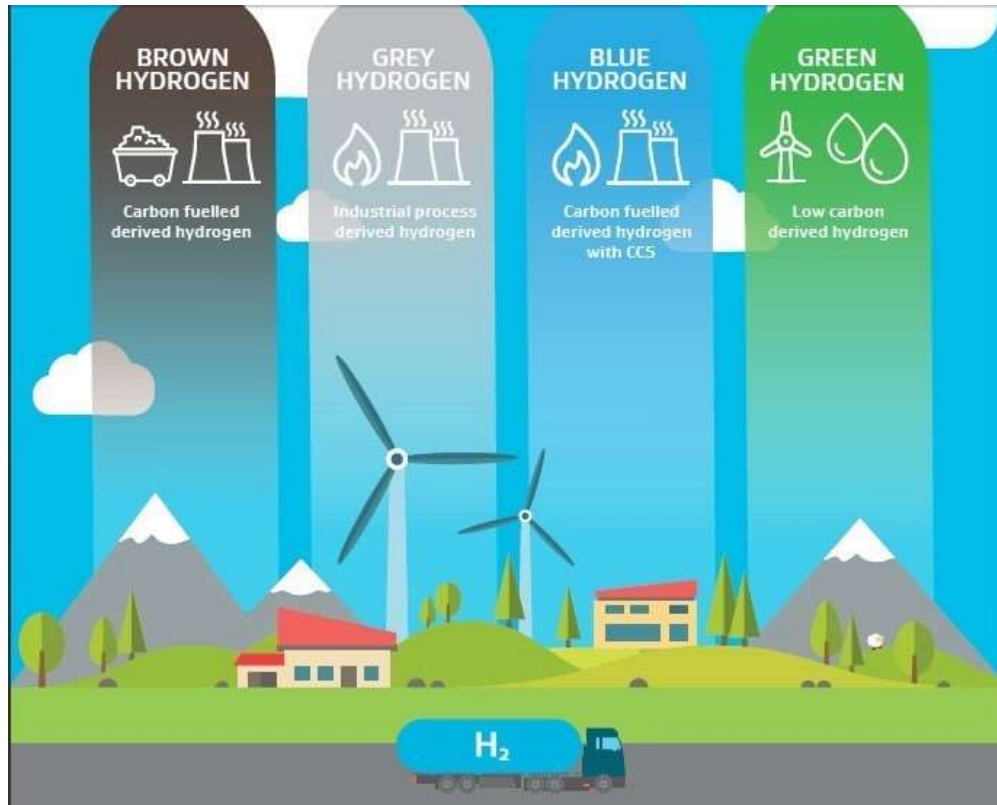


Strategic push in national roadmaps



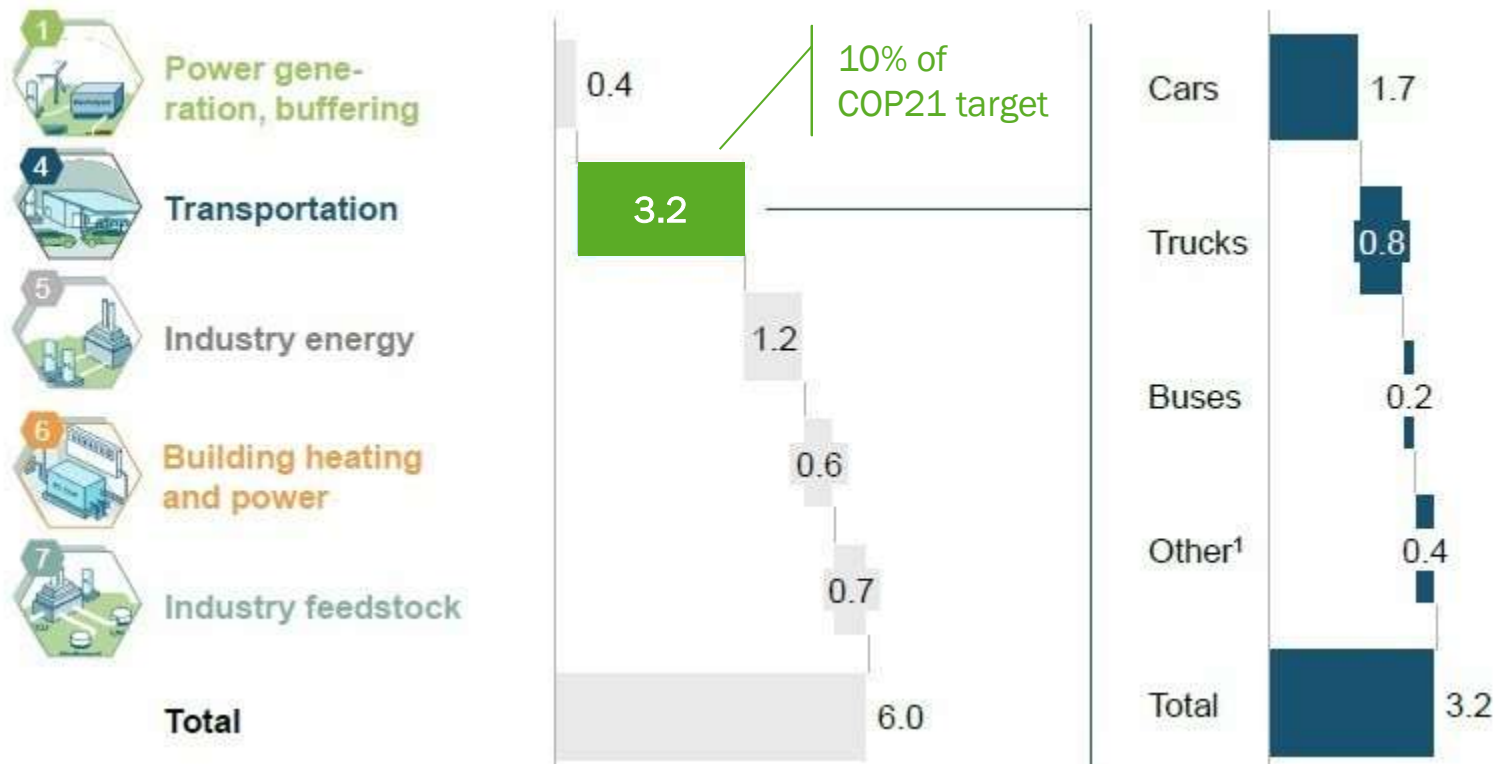
Industry alliances and momentum growing

# Hydrogen? Yes of course, but make it « Green » please



# H<sub>2</sub> Mobility has a major role to play in De-carbonation

CO<sub>2</sub> avoidance potential 2050, in Gigatons



# PO vision: to be the leader in Onboard Energy Supply

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# Fuel cells meet key challenges better than full-electric cars

8



PLASTIC OMNIUM - Hydrogen conference (Oddo)

SEPTEMBER 28<sup>TH</sup>, 2020





# Fuel cells meet key challenges better than full-electric cars

## AUTONOMY

How far the car can go on a full charge



## FILL TIME

How long it takes to (re-)charge the car



## COST

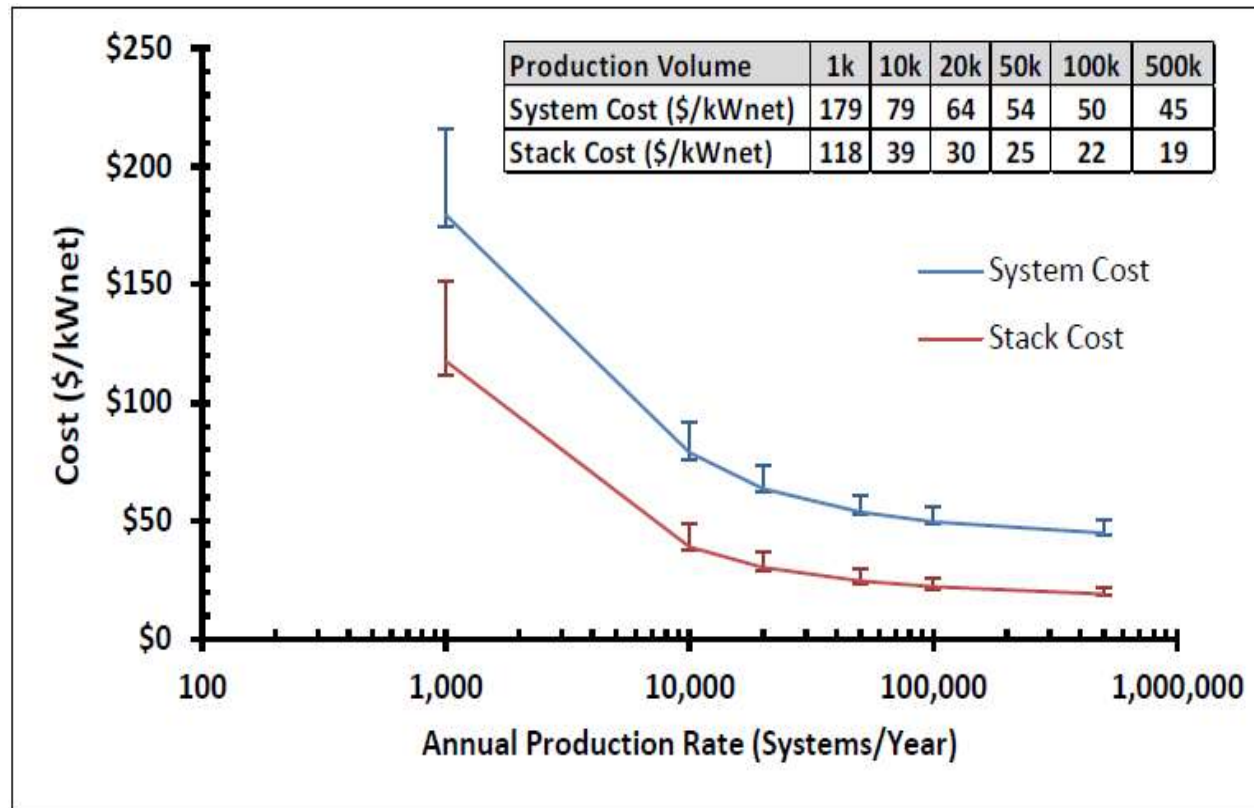
To OEMs and thus to consumers



## 2.4. Fuel Cell Systems

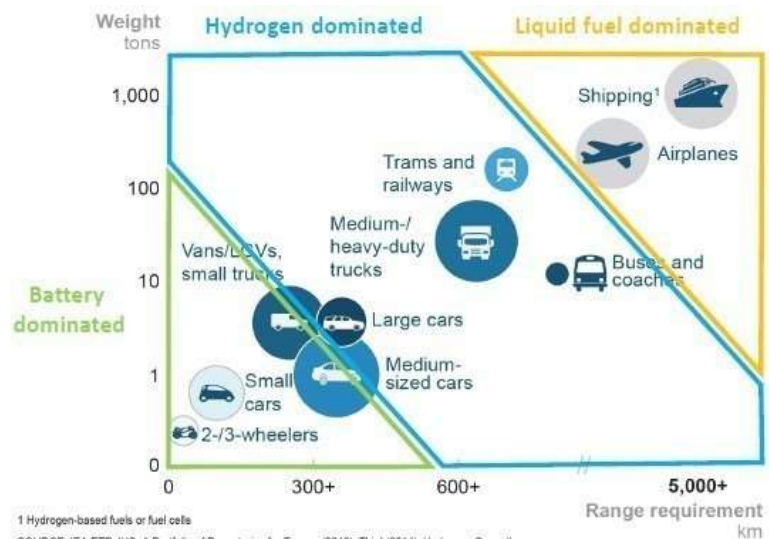
Market price evolution for FC systems (DOE figures)

10



# Hydrogen: market taking off strong momentum

## FCEV potential role in transport



○ Bubble size roughly representing the annual energy consumption of this vehicle type in 2050 (1 EJ)  
 Bubble color representing the market share of hydrogen vehicles (% of sales) in 2050  
 FCEVs: ● <15% ● 15-25% ● 25-35% ● 35-45% ● >45% H<sub>2</sub>-fuels: ● Up to 5%

Plastic Omnium will focus its H<sub>2</sub> offer on road mobility applications:

- Passenger cars: 1.7M vehicles in 2030
- Commercial vehicles: 300-400k vehicles by 2030



## A sizable market

# 2030 MARKET PREDICTIONS FOR H<sub>2</sub> VEHICLES 2 MILLION UNITS



**100,000 units** SOURCE: IEA



**200,000 units** SOURCE: HYDROGEN EUROPE



**400,000 units** SOURCE: 5-YEAR PLAN



**500,000 units** SOURCE: GOVERNMENT BODY



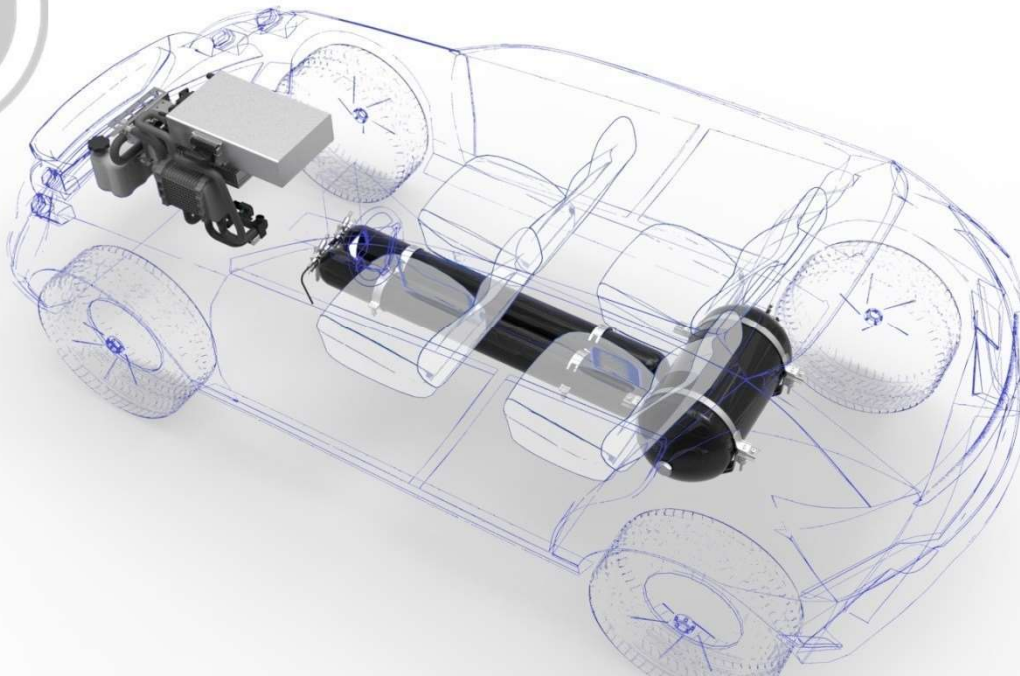
**800,000 units** SOURCE: METI



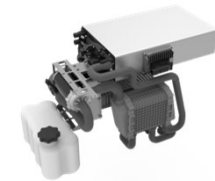
# Plastic Omnium New Energies



*“Plastic Omnium aims to be a leader in On-board energy storage and supply”*



High Pressure Vessel  
200, 350 & 700 bar



Fuel Cell System

Hydrogen Council



# 2018 – Strategic acquisitions in the hydrogen field

**OPTIMUM CPV™**  
COMPOSITE PRESSURE VESSEL  
Composite pressure vessel  
HQ Zonhoven, Belgium

**SWISS HYDROGEN**  
PEM Fuel cell systems  
10-100kW  
Fribourg, Switzerland

These companies accelerate PO's positioning as a full system supplier

BOOST  
INNOVATION  
CAPACITY



BUILD OUR  
KNOW HOW



AGILE WORKING  
METHODS



€200m invested between 2018 and 2020



INDUSTRIALIZATION  
& AUTOMOTIVE  
EXPERTISE



GLOBAL  
FOOTPRINT



BOOST  
INNOVATION  
CAPACITY



# HYDROGEN STORAGE - HIGH PRESSURE VESSELS





# Why HIGH PRESSURE?

HYDROGEN IS EXTREMELY....



ENERGETIC  
1Kg = 100Km



LIGHT  
1L = 0,09g

AT ATMOSPHERIC PRESSURE



# Why HIGH PRESSURE?

HYDROGEN IS EXTREMELY....

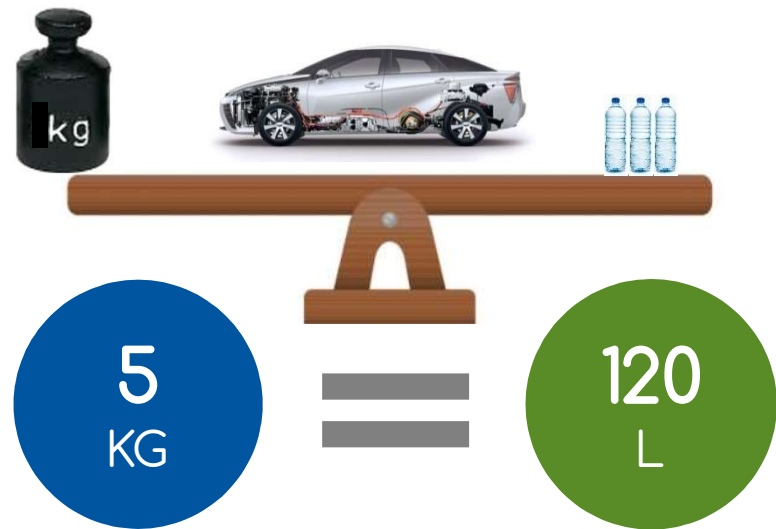


ENERGETIC  
1Kg = 100Km

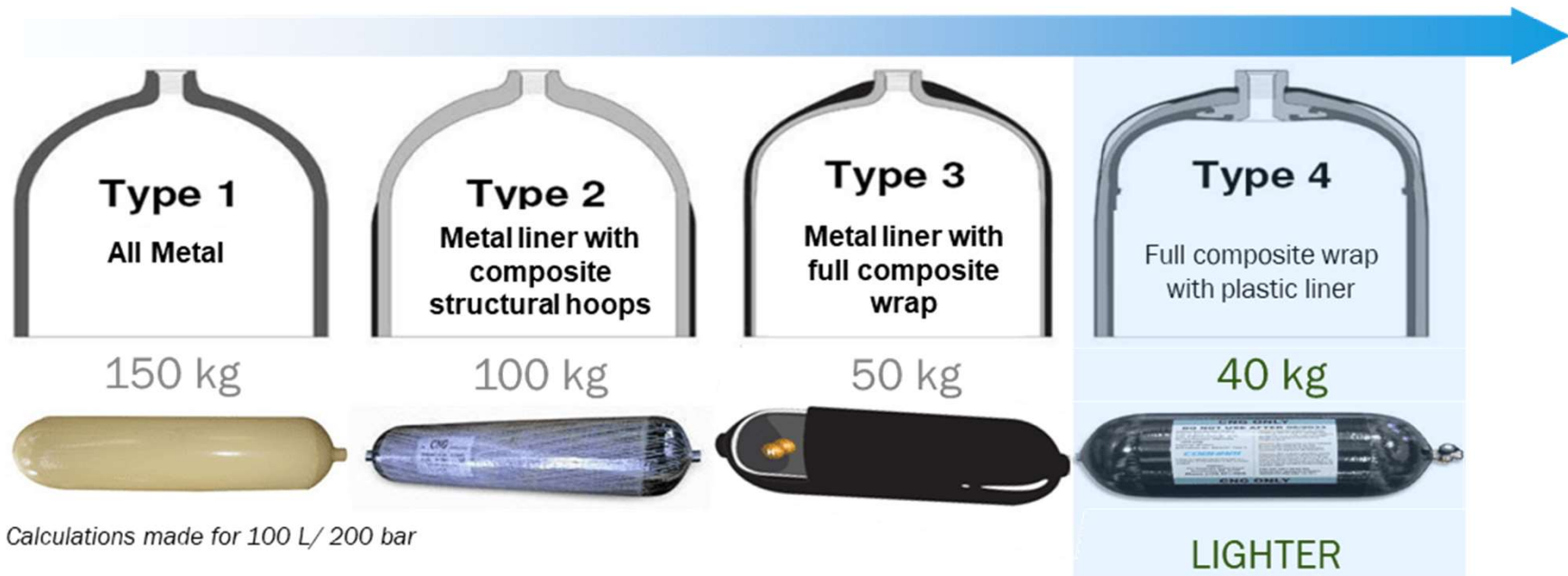


LIGHT  
1L = 0,09g

AT 700 BARS



# High pressure storage - a design driven by weight reduction

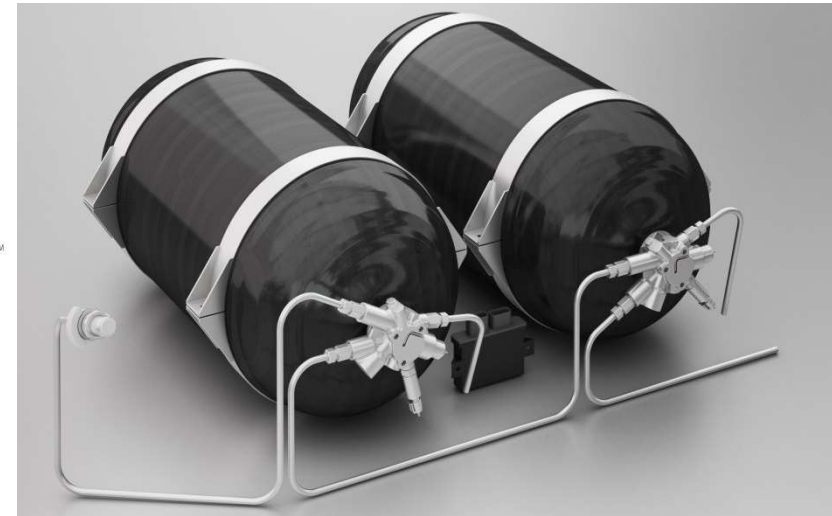


Type 4 is considered as state of the art for Light Duty Vehicles (light, safe, fatigue resistant)

# What is Plastic Omnium unique selling proposal for tanks?

20

- PLASTIC LINER MANUFACTURING
  - **Blow Moulding or Injection moulding**
  - **P0 core process – 20M parts per year**
- COMPOSITE DESIGN
  - **Proprietary design software**
  - **State of the art manufacturing**
- ELECTRONICS
  - **P0 expertise in depollution**
- GLOBAL AUTOMOTIVE TIER 1



# PO Hydrogen storage system - Trucks



# Recent successes confirming our successful positioning

“Plastic Omnium has won a significant order from a German manufacturer for the development of 350-bar hydrogen tanks.”



# Recent successes confirming our successful positioning

By 2021, Plastic Omnium will supply a complete system for trucks to be manufactured by VDL



# Recent successes confirming our successful positioning

Plastic Omnium becomes partner of MissionH24 and exclusive supplier of the hydrogen storage system for cars competing in the 24 Hours of Le Mans from 2024



**Plastic Omnium becomes partner of MissionH24 and exclusive supplier of the hydrogen storage system for cars competing in the 24 Hours of Le Mans from 2024**

Levallois, September 24, 2020

With the 2020 24 Hours of Le Mans fast approaching, Plastic Omnium has become the partner of MissionH24, the project developed jointly between the race's promoter, Automobile Club de l'Ouest, and GreenGT, the Franco-Swiss high technology group specializing in high-powered electro-hydrogen propulsion systems. MissionH24's objective is to establish a category for electro-hydrogen prototypes in the 24 Hours of Le Mans from 2024 on.

Plastic Omnium will be the exclusive supplier of hydrogen gas storage systems for all teams competing in this new hydrogen category.

To achieve this goal, Plastic Omnium will provide hydrogen storage for all race prototypes developed by MissionH24 up until 2024. The prototypes will be used to test the technologies before using them in competition cars from that year on. These systems will be tested in both closed trials and races to demonstrate the potential of the zero-emissions hydrogen technology.

On Saturday, September 10 at 2:12 p.m. MissionH24's LMPH24 prototype, designed by GreenGT, will complete a lap of the circuit in the build-up to the 2020 24 Hours of Le Mans, which starts officially at 2:30 p.m.

The high-pressure hydrogen storage systems developed by Plastic Omnium will be subjected to highly demanding operating conditions in terms of speed, refueling frequency and temperature. They will be certified to automotive standards and will enable Plastic Omnium to showcase its expertise in Type 4 tanks – carbon-fiber shells with a plastic liner – and strengthen its links with the auto manufacturers pioneering this technology.

"For this project, we'll be developing systems subject to extreme operating conditions. Motor sport and large-scale auto industry both require performance, safety and innovation, and MissionH24 is more than a technological demonstration – it's an amazing laboratory in which to accelerate our hydrogen storage innovations, working closely with auto manufacturers." Christian Kopp, President and CEO of Plastic Omnium Clean Energy Systems.


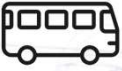
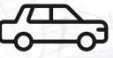

**Plastic Omnium Information:** Tel: +33 (0)1 40 27 56 78 Fax: +33 (0)1 40 27 56 83 Email: [op@plasticomnium.com](mailto:op@plasticomnium.com) [www.plasticomnium.com](http://www.plasticomnium.com)  
Plastic Omnium is the world leader in hydrogen storage systems, clean energy systems and thermal insulation.  
The Group had in 2019 revenue amounting to 3,000 million in 15 plants in 10 countries, serving 83 automotive brands.  
Plastic Omnium is located in Levallois-Perret, France. Incorporated in France. Registered office: 10 rue de la République, 93000 Levallois-Perret, France.  
EU value added: FR0001261013



# PO is seen as a leader, helping to create this market

## HYDROGEN

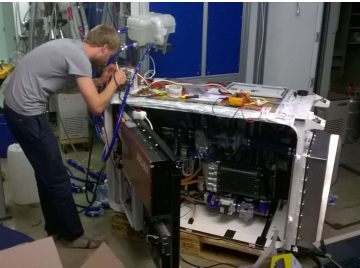
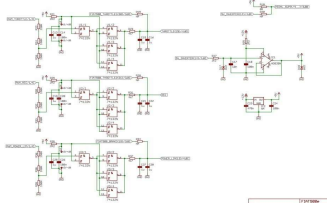
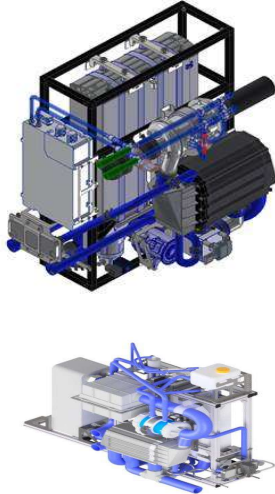
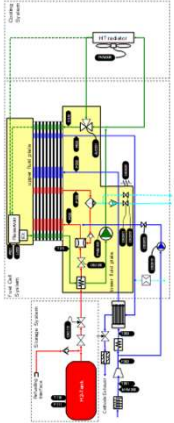
700 and 350 bar certifications obtained in Q4 2019 and Q1 2020

	PRE-DEV UNDERWAY
	WON RFQ
	SUBMITTED BID
	SUBMITTED BID

# NEW ENERGIES – Systems for fuel cell powered vehicles



# PEMFC system competences



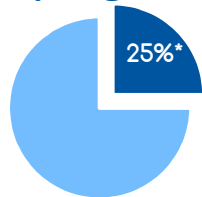
# Developing a leadership position in New Energies

Focus on acquisition and development of SKILLS in :

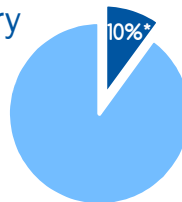
- Engineering
- Manufacturing

to achieve a Leadership position in :

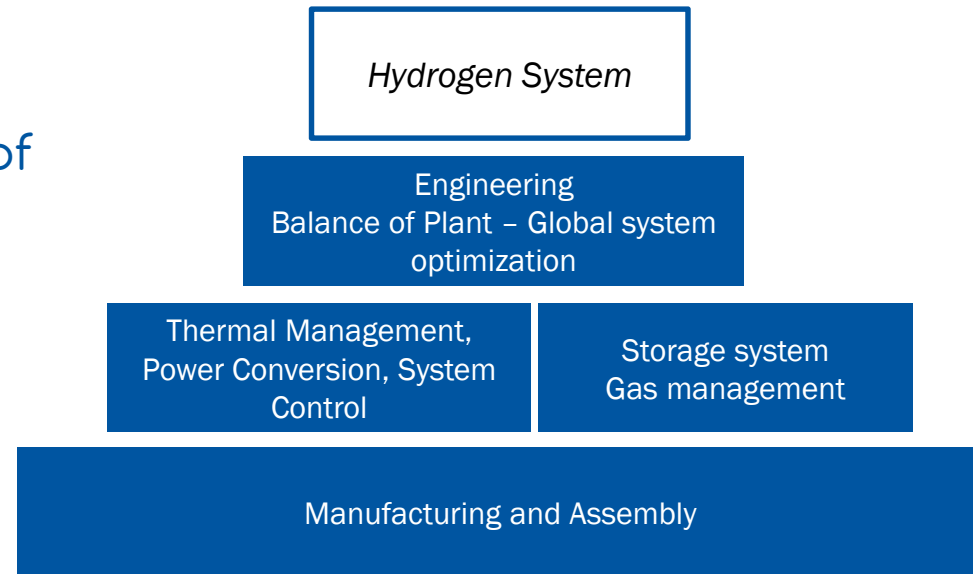
- Hydrogen Storage

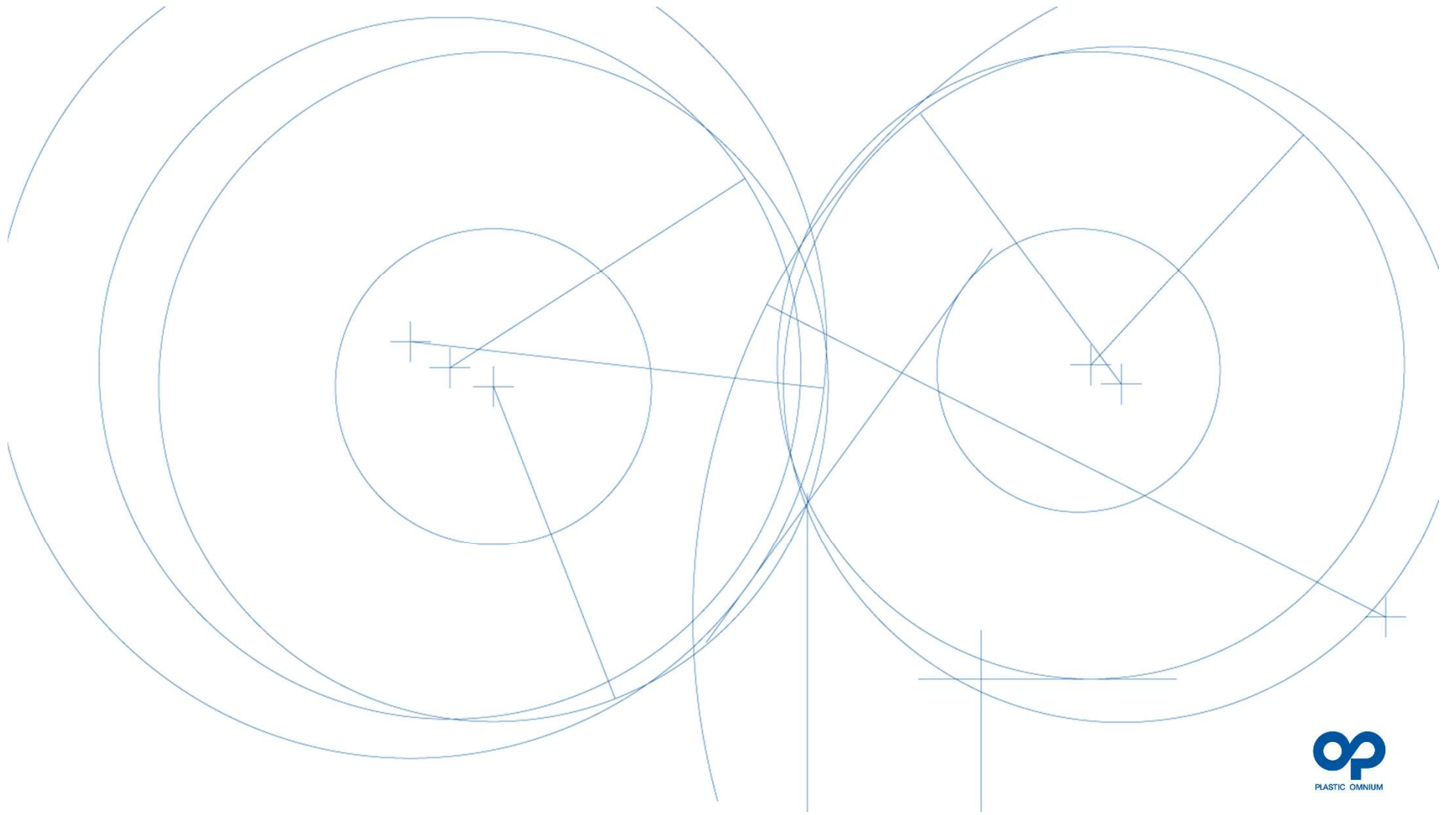


- Energy Production & Delivery



(\*) Market shares in 2030





PLASTIC OMNIUM